

## Alg. 2 Warm Up #13-1

- Find an equation of the parabola with a minimum at (5, -6) and passing through the origin.
- Find an exponential equation through (2, 8) & (5, 512).
- Simplify:
  - $36^{-1/2}$
  - $16^{3/2}$
  - $8^{-2/3}$
  - $\left(\frac{1}{81}\right)^{-3/4}$

### METHODS AND MEANINGS

#### Inequalities with Absolute Value

**MATH NOTES**

If  $k$  is any positive number, an inequality of the form  $|f(x)| > k$  is equivalent to the statement  $f(x) > k$  OR  $f(x) < -k$ .

For example,  $|2x - 17| > 9$  is equivalent to  $2x - 17 > 9$  or  $2x - 17 < -9$ . Solving yields  $x > 13$  or  $x < 4$ .

$|f(x)| < k$  is equivalent to the statement  $-k < f(x) < k$ . Another way to write this is  $f(x) > -k$  AND  $f(x) < k$ . For example,  $|x + 4| < 9$  is equivalent to  $-9 < x + 4 < 9$ . Solving yields  $-13 < x < 5$ , that is,  $x > -13$  and  $x < 5$ .

$|2x - 17| > 9$

Means  $(2x - 17)$  is more than 9 units from zero

$2x - 17 < -9$  or  $2x - 17 > 9$

$+17 \quad +17$        $+17 \quad +17$

$2x < 8$        $2x > 26$

$x < 4$  or  $x > 13$

$|x + 4| < 9$

Means  $(x + 4)$  is less than 9 units from 0

$-9 < x + 4 < 9$

$-4 \quad -4 \quad -4$

$-13 < x < 5$

The homework over the break was long...

Take a few minutes to go over homework with your team, then we'll go over questions.

**HW Questions:**

4-84. Solve each of the following inequalities. Express the solutions algebraically and on a number line.

a.  $3x - 5 \leq 7$

b.  $x^2 + 6 > 42$

- 4-87. This problem is a checkpoint for solving for one variable in an equation with two or more variables. It will be referred to as Checkpoint 4B.



Rewrite the following equations so that you could enter them into a graphing calculator. In other words, solve for  $y$ .

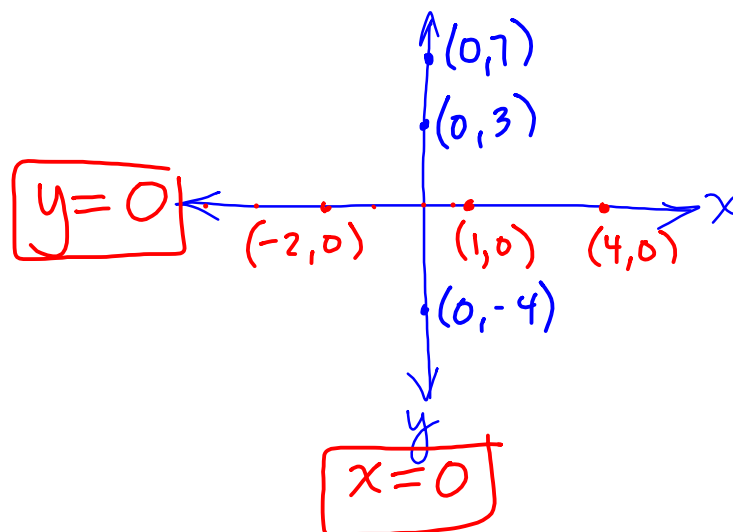
a.  $x - 3(y + 2) = 6$

b.  $\frac{6x-1}{y} - 3 = 2$

c.  $\sqrt{y-4} = x+1$

d.  $(\sqrt{y+4})^2 = (x+2)^2$   
 $y+4 = x^2 + 4x + 4$   
 $y = x^2 + 4x$

- 4-88. Think about the axis system in the two-dimensional coordinate plane. What is the equation of the  $x$ -axis? What is the equation of the  $y$ -axis?



- 4-92. Solve the system of equations at right algebraically and explain what the solution tells you about the graphs of the two equations.

$$3x + 2 = y$$

$$-9x + 3y = 11$$

- 4-96. Solve the system of equations at right.

$$x + 3y = 16$$

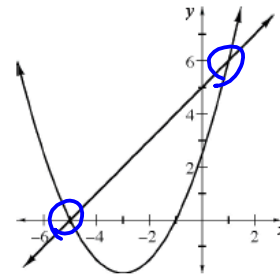
- a. Now rewrite the system and replace  $x$  with  $x^2$ .

$$x - 2y = 31$$

- b. What effect will this have on the solution to the system?  
Solve the new system.

$$\begin{array}{l}
 x^2 - 2y = 31 \\
 x^2 - 2(-3) = 31 \\
 \quad -6 \quad -6 \\
 \sqrt{x^2} = \sqrt{25} \\
 x = \pm 5 \\
 (5, -3) \quad (-5, -3)
 \end{array}
 \qquad
 \begin{array}{r}
 x^2 + 3y = 16 \\
 - (x^2 - 2y = 31) \\
 \hline
 5y = -15 \\
 \frac{5}{5} \quad \frac{-15}{5} \\
 y = -3
 \end{array}$$

4-99. Consider the graph at right as you answer the following questions.



- Find the equation of the parabola.
- Find the equation of the line.
- Use your graph to solve  $x + 5 = \frac{1}{2}(x + 3)^2 - 2$ .
- Use your graph to solve the system.

$$y = \frac{1}{2}(x + 3)^2 - 2$$

$$y = x + 5$$

$$x = -5, 1$$

- Use your graph to solve the inequality  $x + 5 < \frac{1}{2}(x + 3)^2 - 2$ .
- Use your graph to solve  $\frac{1}{2}(x + 3)^2 - 2 = 0$ .
- Use your graph to solve  $x + 5 = 4$ .
- How could you change the equation of the parabola so that the parabola and the line do not intersect? Is there more than one way?

4-101. Solve each of the following inequalities. Represent the solutions algebraically and on a number line.

a.  $2|3x - 5| \geq 4$

b.  $\frac{1}{3}(3x - 6)^3 + 4 < 13$

$$\frac{1}{3}(3x - 6)^3 < 9$$

$$3\sqrt{(3x - 6)^3} < \sqrt[3]{27}$$

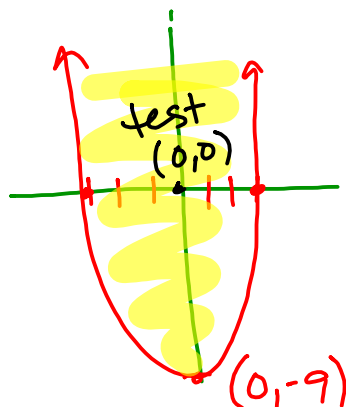
$$3x - 6 < 3$$

4-102. On separate pairs of axes, sketch the graph of each equation or inequality below.

a.  $y + 5 = (x - 2)^2$       b.  $y \leq (x + 3)^3$       c.  $y = 4 + \frac{1}{x-3}$

4-104. Graph the solutions to each of the following inequalities on a different set of axes. Label each graph with the inequality as given and with its  $y=$  form. Choose a test point and show that it gives the same result in both forms of your inequality.

a.  $3x - 3 < y$       b.  $3 > y$       c.  $3x - 2y \leq 6$       d.  $x^2 - y \leq 9$



$$x^2 \leq y + 9$$

$$x^2 - 9 \leq y$$

$$0 - 9 \stackrel{?}{\leq} 0$$

$$y = x^2 - 9$$

$$0 = (x - 3)(x + 3)$$

4-105. Solve for  $w$  in each equation below.

a.  $w^2 + 4w = 0$

$$w(w+4) = 0$$

$$w = 0, -4$$

b.  $5w^2 - 2w = 0$

c.  $w^2 = 6w$

$$w^2 - 6w = 0$$

$$w(w-6) = 0$$

$$w = 0, 6$$

Last HW:

CI 4- #106 ---> 112

and Pink Final Exam Rev. WS